PlantWatch

Installation and user manual

Preliminary

LEGGI E CONSERVA QUESTE ISTRUZIONI

READ AND SAVE THESE INSTRUCTIONS

CAREL

Technology & Evolution

We wish to save you time and money!
We can assure you that the thorough reading of this manual will guarantee correct installation and safe use of the product described.

IMPORTANT WARNINGS

BEFORE INSTALLING OR HANDLING THE DEVICE PLEASE CAREFULLY READ AND FOLLOW THE INSTRUCTIONS DESCRIBED IN THIS MANUAL.

This appliance has been developed to operate risk-free, as long as:

- it is installed, operated and maintained according to the instructions contained in this manual;
- the environmental conditions and the voltage of the power supply correspond to those specified.

All other uses and modifications made to the device which are not authorised by the manufacturer are considered incorrect.
Liability for injury or damage caused by the incorrect use of the device lies exclusively with the user.
Please note that the machine contains powered electrical devices and therefore all service and maintenance operations must be performed by specialist and qualified personnel who are aware of the necessary precautions.
Disconnect the machine from the mains power supply before accessing any internal parts.
Disposal of the parts of the controller:
The controller is made up of metal and plastic parts. All these components must be disposed of according to the local standards in force.
Cleaning the controller
Only use neutral detergents and water.

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1. INTRODUCTION

PlantWatch is an electronic microprocessor-based device that performs the task of supervising a network of Carel instruments. It manages and records the alarms and the logs of the main values controlled, allowing the data to be transferred via modem to a service centre. It can also transmit the alarms by fax or SMS and print automatic reports.
Its main use is for the supervision of small and medium-sized supermarkets.
PlantWatch *is not* a stand-alone DataLogger: it is not fitted with its own probes, but rather reads the values measured by the other instruments connected to it.

1.1 General characteristics

PlantWatch, while featuring functions that can normally be obtained only using a personal computer, is extremely compact and easy to use. It is a completely independent device, in that its operation does not require the installation of any external device or software; its own keypad and display allow the fundamental parameters to be set.
Even greater flexibility can be obtained using the options available for the PlantWatch line. The remote connection, fax, SMS and data centre connection features are available only when PlantWatch is fitted with a modem. There are two possible solutions in this case: order the version with internal modem, PLW00M0000, or alternatively connect an external PSTN or GSM modem, using the PLW0PMD000 adapter.
Using the RS485-Printer adapter, PlantWatch can be connected to a parallel printer, which can be located at any point of the RS485 network that connects PlantWatch to the Carel instruments. The RS485-Printer adapter also performs the function of network watch-dog.

1.2 Codes

codes	description
PLW00B0000	Basic version, an external modem may be connected to the RS232 port using an 8-way telephone connector - DB25 male adapter (kit PLW0PMD000), power supply 230V.
PLW00U0000	As per the PLW00B0000, yet with 115V power supply.
PLW00M0000	Version fitted with internal 33.6 PSTN modem. Power supply 230V
PLW0PPC000	Kit for RS 232 direct serial connection to a personal computer. The kit is made up of a 5-metre, 8-way flat telephone cable, an RJ45-DB9 female adapter with DCE connections for direct fitting to the PC's serial port, and the *"PlantWatch manager"* configuration software.
PLW0PMD000	Kit for the connection of an external modem. It contains a 5-metre, 8-way flat telephone cable, an RJ45-DB25 male adapter with DTE connections for direct fitting to the female connector on the modem.
PLWOPPRT00	Parallel printer adapter module for the Carel RS485 network, desk-top version complete with 230V power plug.
PLWOPPRD00	Parallel printer adapter module for the Carel RS485 network, DIN rail version.

Table. 2.1

All the versions feature an RS232 port on the 8-way telephone connector, which is permanently accessible through the channel (maximum length 10m) or alternatively by removing the front panel for the initial configuration or downloading the data logs. The connection to the PC is made using a cable adapter from the telephone connector to a DB9 female connector.
All the versions feature the management of a Centronics parallel printer using an optional module connected to the RS485 peripherals network (PLWOPPRT00/ PLWOPPRD00)

1.3 Connectors available

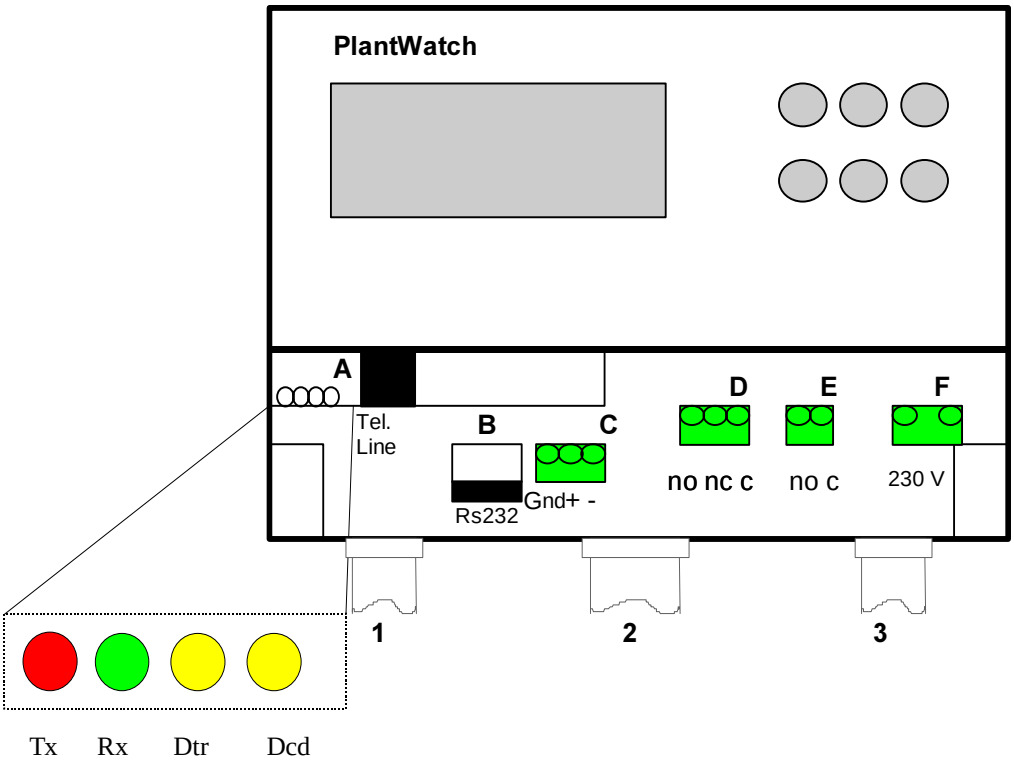


Fig. 1.3.1

Meaning of the internal LEDs on the modem board (model PLW00M0000 only)

Tx (red)	Data transmission	PW ⇒ remote modem
Rx (green)	Data reception	PW ⇐ remote modem
Dtr (yellow)	Data terminal ready	PW modem ready
Cd (yellow)	Carrier detect	connecting to the remote modem

Description of the connectors

A	6-way RJ-11 for PSTN telephone line (only for version with internal modem)
B	8-way RJ-45 for RS232 serial (downloading log, uploading parameters, code and external modem connection)
C	3-way RS485 serial terminal for connection to Carel controllers and printer board
D	3-way terminal for 230V alarm signal (relay)
E	2-way terminal for 230V external modem reset (relay)
F	230V or 110V power supply (depending on the version)

Warnings and use of the channels

1 Use channel **1** to pass the telephone line cable; no other cables, not even very low voltage cables, may pass through channel **1**

2 Use channel **2** for the RS485 line that connects the Carel instruments, it may also be used at the same time to pass the lines carrying any very low voltage safety loads activated by relays D and E. This channel can also be used for the RS232 line if using the external modem or a permanent connection to the personal computer

3 Channel **3** should be used to pass the PlantWatch power supply line and for the lines of any mains voltage loads activated by relays D and E

2. INSTALLATION

2.1 Mounting PlantWatch

PlantWatch must be wall-mounted.
- Unscrew the two front screws (see a, b) and remove the central door (c).
- Unscrew the two screws (d, e) that hold the lower cover and the front panel of PlantWatch together, and separate the two parts.
- After having chosen where to pass the channel and having made the corresponding holes (in the pre-drilled lower part - i) for the cable or tubing glands, make the three holes (m, n, o) in the wall.
- Insert the channels only in the lower part of the device
- Insert the "wall" screw anchors supplied in the kit, into the holes made in the wall, and then fasten the rear part of the PlantWatch device to the wall using the three screws (m, n, o) and corresponding O-rings.
- Fasten the cable or tubing glands before fitting the front panel of the PlantWatch device.
- Then fit the front panel, paying attention to the position of the upper teeth (h) and the correct fastening of the 2 screws (d, e) (do not over-tighten, so as to not deform the plastic).
- After having connected the wires to the terminal block in the PlantWatch device, close the door (c).

Caution: after completing the wiring operations, strap the wires together for each group of terminals, so as to ensure safety if one individual wire is detached

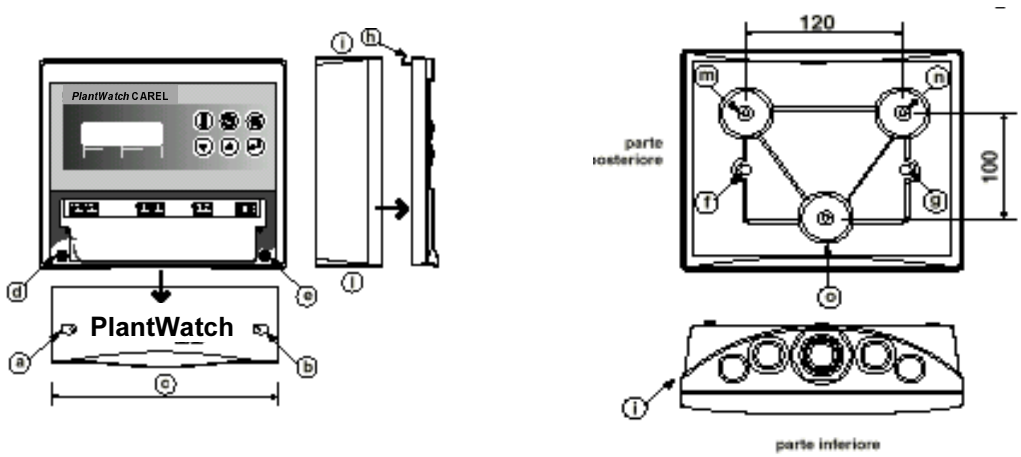


Fig. 2.1.1

Warnings:
Do not install the instrument in environments with the following characteristics:
- wide and rapid fluctuations in ambient temperature;
- relative humidity over 80%;
- exposure to direct pressurised jets of water;
- high levels of magnetic and/or radio frequency interference (e.g. from transmitting antennae).

Use cable terminals suitable for the corresponding terminals. Loosen each screw and insert the cable ends, then tighten the screws. When the operation is completed, slightly tug the cables to check that they are sufficiently tight.
Separate as much as possible the signal cables from the cables carrying inductive loads and power cables to avoid possible electromagnetic disturbance. Never insert power cables (including the electrical cables) and RS485, RS232 signal cables in the same channels. The telephone system must use completely separate channels, as per the relative standards.
The lightning symbol inside an equilateral triangle signals the presence of dangerous voltages.
Avoid touching or nearly touching the electronic components on the boards, to avoid electrostatic discharges (extremely damaging) from the operator to the components.
For safety reasons, disconnect power before opening the door. The set-up procedure via RS232 ("PlantWatch manager") with the door open may only be effected by 'specialist personnel', in that powered parts are accessible (power supply and telephone network).

2.2 Making the connections

Power supply - terminal F
PlantWatch must be supplied by a dedicated electrical line fitted with an exclusive two-pole switch.

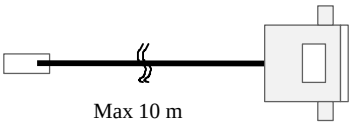
Reset external modem - terminal E
Terminal E may be used for the power supply of the external modem. It is used only if the configuration includes the external modem.
The relay is normally closed; at the PlantWatch reset and then at regular 20 minute intervals, before sending the modem initialisation commands, it is open to ensure the hardware reset of the modem. The opening time is 1.5 seconds.

Alarm relay - terminal D
The alarm relay allows the PlantWatch to be connected to signal devices that operate by impulses, such as telephone diallers, as well as sirens, signal lamps etc..... The normally open/closed modes can be selected by the corresponding parameter.

RS485 network - terminal C
This terminal is connected to the 3-wire RS485 network (twisted pair + shield) that connects the instruments controlled by PlantWatch. The network should be terminated with a 120Ω, ¼ watt resistor. Use AWG20/22 cables with a capacitance between the leads of less than 90pF/m (BELDEN 8761-8762 cables).
The RS485 section is optically-isolated from the other signals present in the PlantWatch system: RS232 line and telephone line.

RS232 line - connector B
The RS232 line is available using an 8-way telephone connector. The direct connection to a personal computer or to the external modem can be made using the adapters supplied in the PLW0PMD000 kit for connection to the modem, or in the PLW0PPC000 kit for connection to the PC. The kit includes a 5-metre, 8-way flat cable fitted with male connectors. If the length of cable supplied is not sufficient, an 8-way telephone cable can be wired to the required length (maximum length 10 metres).

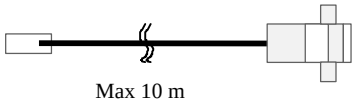
PLW0PMD000



RJ45 M DB 25 M

Fig. 2.2.1

PLW0PPC000



RJ45 M DB 9 F

Fig. 2.2.2

Telephone line - connector A
Connector A (RJ-11) is present only in the PlantWatch version fitted with internal modem. It can only be used for connection to a PSTN telephone line

3. USER INTERFACE

The user interface is made up of an alphanumeric LCD display, with 4 rows of characters, and a 6-button keypad (4 of which are backlit).

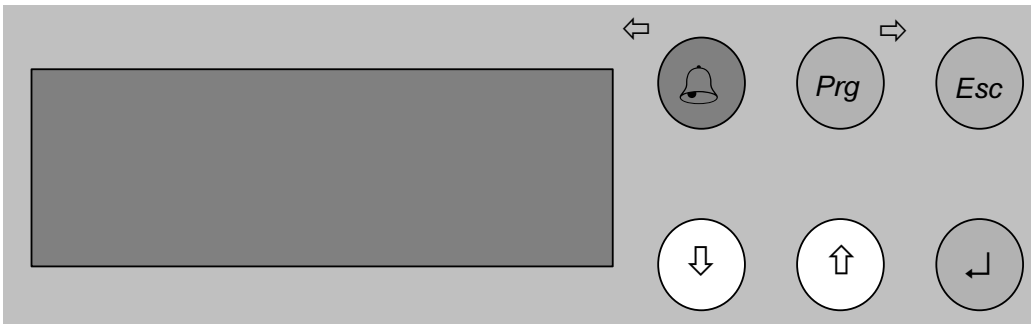


Fig. 3.1.1

3.1 Meaning of the buttons

Button	Function
🔔 (⇦)	Silences the buzzer and display the alarms, holding for 3 seconds deactivates the alarm relay Moves the cursor to the left when editing
Prg (⇨)	Pressed for 3 seconds allows the parameters to be set (password) Moves the cursor to the right when editing
Esc	Returns to the main screen of the root menu Returns to the previous selection menu screen Cancels the modifications to the current field Pressed for 3 seconds when programming the parameters, cancels the modifications effected and exits this mode
⇩	scrolls the screens decreases the current field
⇧	scrolls the screens increases the current field
↵	confirms the current field

3.2 Meaning of the LEDs

LED	Function
🔔	flashing: at least one alarm active stays on: no active alarms, but the alarms have not yet been displayed
Prg	parameter programming status
↵	power status

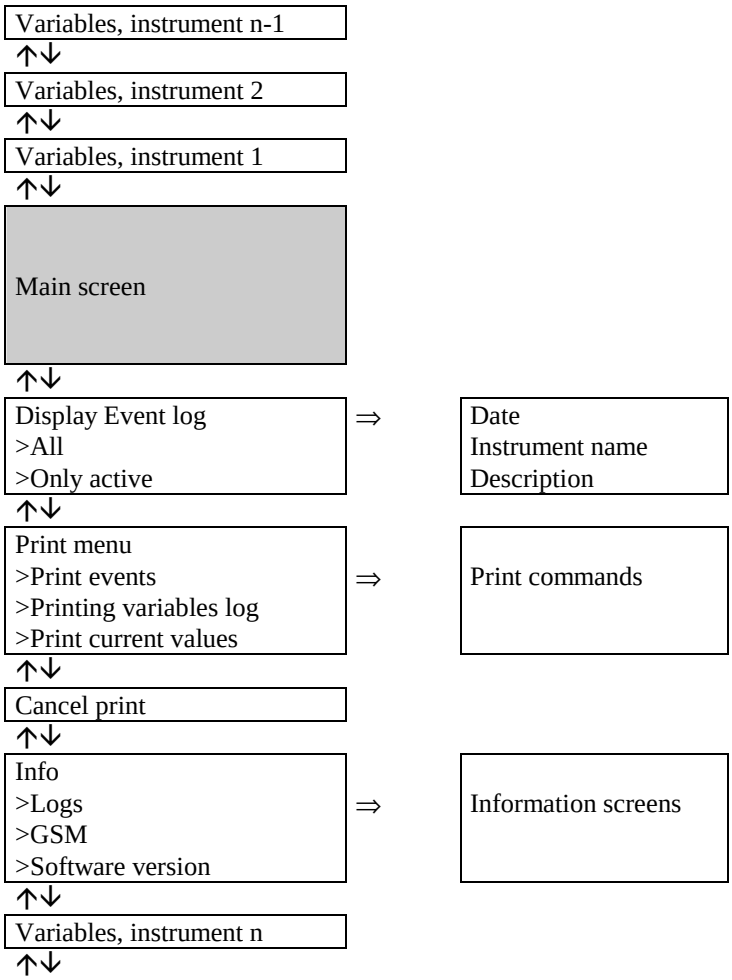
3.3 Operation

The screens on the user interface are organised into two main sections, one corresponding to the display only of the data, which contains the main screen, and the other containing the configuration screens, accessible fully or in part after having entered the password (see paragraph 9). On start-up, PlantWatch goes to the main screen of the display-only branch.
The buttons used to move between the screens are ⇑, ⇓, ↵ and Esc. The arrow buttons scroll the screens on the same level. When the screen shows the ">"symbol followed by a name, it means that this screen is a *menu*, the names are the descriptions of the branches of screens which can be accessed. In a menu screen, the ↵ (Enter) button selects the first item on the menu, while the arrow buttons scroll the other items. Once the item required has been selected, the enter button accesses the first screen of the selected branch. At this point, the arrows scroll the screens, the Esc (Escape) button returns to the previous selection menu.

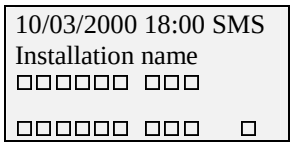
In the screens that feature modifiable fields, the ↵ button selects the various fields in sequence, in this case the screens can be scrolled again only when the cursor returns to the top left position. When the cursor is in a field, the arrow buttons ⇑, ⇓ increase or decrease the current numbers or characters (strings) while the horizontal arrows ⇐,⇒ move the cursors to the adjacent characters. In a numeric field, increasing from the number 9 increases the next highest digit.
Inside a field, pressing the Esc button resets the value prior to the modification.

3.4 Display screen

On start-up, PlantWatch displays the main screen that summarises the status of the instruments, the status of PlantWatch itself, and the current date and time. From this screen, the arrow buttons can be used to scroll the display of the instrument variables and to access the menus. These can display the log of the events/alarms, activate manual prints and access the *Info* menu.



3.4.1 Main screen



Row 1
The first row displays the current date and time, in addition the character in the top right indicates the status of the modem (if no modem is present, no symbol is displayed). The symbols used are:

dd	dialling number for data transmission
Dd	waiting for connection after dialling number for data transmission
Dsm	dialling number to send SMS message by PSTN modem
Dfx	waiting for connection after dialling number to send fax
F	Fax transmission in progress
f	Fax transmission in progress
h	disconnecting
i	initialising modem
net	GSM modem only: request network information and signal intensity, and registration
O	Connection between modems, wait for login from data centre
p	connecting
R	ring received: waiting for connection
SMS	Sending SMS message, GSM and PSTN
Pn?	GSM modem only: Request PIN status from modem
Pn	GSM modem only: Send PIN
PIN	GSM modem only: PIN error, the modem cannot be used!
W	waiting for call (normal operating status)

Row 2
On the second row, if there are no active alarms, the string “installation name” is displayed, as set by the user during configuration, or alternatively the text “Active alarms:” followed by a number that represents the number of alarms present.

Rows 3 and 4

The symbols of the peripherals from 1 to 32 indicate:	
empty rectangle	periph. on-line without alarms
filled rectangle, flashing	periph. on-line with active alarms
rectangle with x inside	periph. on-line, but the user has disabled the alarms for maintenance
X	periph. off-line
-	not present in configuration

An empty space separates the symbols into groups of 8, so as to assist in identifying the addresses of the peripherals.

The symbol in the lower right indicates the status of the printer module:	
empty rectangle with horizontal line inside	printer module on-line without alarms
filled rectangle, flashing	printer module on-line, but the printer is blocked; this is the only print alarm managed by PlantWatch, and in fact may be generated only following a print action that is not satisfied
rectangle with x inside	printer module off-line

If the character “!” is displayed to the side of the empty printer rectangle, the printer is off-line or an error has occurred; this may be due to no paper, the user having put the printer off-line, the printer being off or the paper being blocked. It is a signal only, and no data is saved to the event log. In fact, the symbol “!” does not represent an alarm until PlantWatch starts printing, in which case an alarm is generated. This may be signalled remotely or not, depending on the configuration (see Chap. *Alarm management*).

3.4.2 Display event log

The event log can be displayed from the menu “Display event log”. Selecting “All” displays all the events saved, from the oldest to the most recent; the ⇓ ⇑ buttons can be used to scroll the list backwards and forwards, while the symbol ! indicates the active alarms. If selecting “Only active”, the list will only contain the active alarms, and the PlantWatch start-up event.
The list of active alarms can also be displayed directly by pressing the 🔔 button. If alarms are saved that are no longer active and have not yet been displayed, accessing this function using the “Alarm” button will switch off the red LED (see alarm management). In the latter case, the display will stop at the last alarm not yet displayed.

Display event log >All >Only active

! 2/01/2000 18:34:23 START ALARM 15: Vegetable cabinet 1 High temperature	28/02/2000 13:31:23 START ALARM PW: modem initialisation error	29/02/2000 14:34:10 PW: Change param. User name	28/02/2000 18:34:56 End alarm PW: modem initialisation error

Row 1
Row 1 shows the date and time at which the event occurred. If the first character displayed in the top left is an exclamation mark, the alarm is still active.

Row 2
If there is an alarm, the second row displays the text “START ALARM” or alternatively “end alarm”. In the case of a display-only event, it is blank.

Rows 3 and 4
Rows 3 and 4 may have 2 meanings, depending on whether the event is a peripheral alarm or alternatively an event/alarm generated internally by PlantWatch (for example, modem initialisation error, printer offline,...):

Peripheral alarm
row 3: *nn: peripheral name*
Where: *nn* = physical address of the peripheral and *peripheral name* = name assigned to the peripheral by the user during configuration (category + description + progressive number)
row 4: *alarm description*

Internal event/alarm
row 3: “PW: alarm/event description”
row 4: alarm/event description

3.4.3 Print menu

Print events From: 3/11/2000 15:25 To: 3/11/2000 16:25 Start: No	Print daily log Day: 3/11/2000 Interval 10min Start: No	Print grouped daily log Day: 3/11/2000 Start: No	Print weekly log Day: 27/10/2000 Fri Start: No
Print values Start: No	Print menu Cancel print? No		

This menu allows the immediate printing of the event log, the variables log and the current values read by the instruments. The variables log is printed as described in the chapter *Printer Management*. To cancel an unwanted print procedure, intervene by responding yes to the “Cancel print?” question in the corresponding screen. The print can also be cancelled directly from the printer module by pressing and holding the button for more than 4 seconds.

3.4.4 Log Info Menu

Variable log Free space: 95% Duration: 25d 14:00

The Info->Log menu displays the percentage of free memory available for saving the logs and the duration of the variable log, expressed in days hours:minutes. The duration refers to the block of minimum duration, see Chap. *Variable log.*

3.4.5 GSM Info Menu

The Info->GSM menu is active only if the modem connected to the serial port is a GSM cellphone type. The following information is available: the name of the network operator that the modem is connected to, the intensity of the signal received as a percentage, and the error rate that the modem is detecting.

Gsm info Reading info	Gsm info Search for network	Gsm info Network name Signal: 35% Err: 0%

The name of the network operator is indicated as a text only if present in the internal list; if this is not the case, the numeric country code is displayed, followed the operator's code. The intensity of the field (Signal) indicates the reliability of the communication, and the value should be greater than 20%. The error rate (Err) indicates the effective quality of the signal received; in optimal conditions this value should be 0.
The initialising of the modem (send PIN) and reading of the data is indicated by the text *Reading info*. If no signal is available from the network operator, the text *Searching for network* is displayed

3.4.6 Software version Menu

Firmware version V1.0 Dec 1 2000 Checksum: A123B7 Cfg: 10/12/2000 12:23

This menu accesses the following information:
Firmware version, compilation date and checksum; date and time of the most recent parameter modification: this data is updated after each modification to the configuration parameters, made either locally or via serial line (directly or via modem).

3.4.7 Display instrument variables

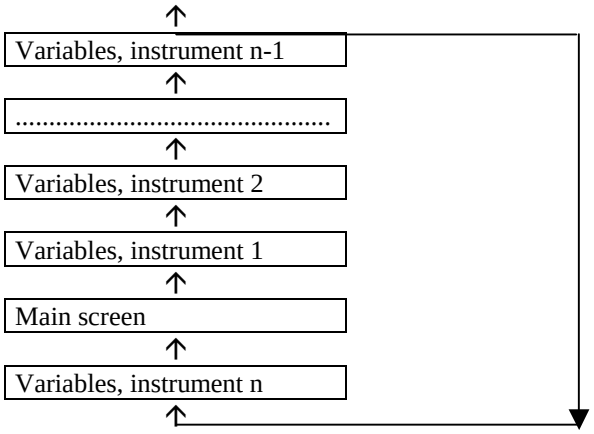
02:Instrument name Variable 1: 20.3 Variable 2: -12.3 Variable 3: -2.3

Pressing the UP button from the main screen scrolls, in sequence, the screens displaying the current values of the variables acquired by the instruments. Up to 3 variables can be displayed for each instrument. These variables are the first three in the list of variables assigned to the log for a specific unit.
If the peripheral selected is off-line, the numeric fields will flash and the last values acquired will be displayed. If the values have never been acquired, asterisks will be displayed.

Pressing the Prg and "Alarm" buttons together for 3 seconds when displaying the data from an instrument temporarily disables the generation of alarms from the instrument in question (see Chap. *Alarm management, Disabling alarms for maintenance*); this status is displayed on the screen by an 'X' in the place of the ":" in row 1. Pressing the Prg and "Alarm" buttons again for 3 seconds re-enables the alarms.

3.4.8 Automatic rotation of status screens

By activating the corresponding parameter, the main screens and screens displaying the instrument variables can be displayed automatically in sequence
On starting PlantWatch, the display starts from the main screen, and then, at 4-second intervals, moves to the screens for instrument 1,2, etc... On pressing any button the rotation is suspended for 1 minute



3.5 Configuration screens

The configuration screens can be accessed only after having entered the password. The corresponding screen is displayed by pressing the Prg button for 3 seconds. If the password entered is correct, the name of the user associated to the password is displayed, along with the main selection menu.
The configuration screens can be exited in the following ways:

Exit and save the modifications: pressing the Prg button and answering “yes” to the question “Save and exit?”; in this case the modifications made to the parameters are rendered active and saved in the flash memory
Exit without saving the modifications: pressing the Esc button for 3 seconds returns directly to the main display screen. The same occurs after 60 seconds of inactivity

A complete description of the parameters and the various set-up screens is provided in the chapter *Parameters and configuration procedure.*

4. EVENT LOG

PlantWatch saves to flash memory the alarms from the instruments connected to the network, as well as any internal situations, which may be alarms or signal-only events. The file that contains this information is called the *event log*, and this stores the following information in chronological order, accompanied by the date and time:

Events/alarms managed

Event	Alarm	
	•	alarms generated by the instruments and sent to PlantWatch via the serial network
	•	off-line status of the instruments (no communication)
	•	off-line status of the printer module
	•	timeout error when printing
•		signal of the intervention of the alarm relay
•		signal of the intervention of the alarm relay on the printer module (when slaved to the PlantWatch relay)
	•	failed log download alarm
	•	any internal PlantWatch malfunctions (flash error, clock, modem...)
	•	instrument configuration errors (type of instrument does not match the configuration)
•		PlantWatch start-up event
•		intervention by the user for the local modification of the parameters or the time, saving the “Username”
•		intervention by the user to temporarily disable/enable the alarm signals for the individual unit
•		intervention by the user to delete the variable log, saving the “Username”
•		intervention by the user to reset the indication of the space available for saving the variable log, saving the “Username”
•		intervention by the user to modify the variables of the peripherals using a local-remote serial connection
•		signal of the outcome of a fax transmission and the number of the recipient
•		signal of the outcome of a data transmission and the number of the recipient
•		signal of the outcome of an SMS message and the number of the recipient

The event log may be printed in real-time, or selected by operator input; in the first case, the printer prints all the events as they occur, while in the second, the operator prints only the data for the period required. The data saved for the events can be sent to the supervisor PC via serial line (directly, or via modem).

5. ALARM MANAGEMENT

5.1 Introduction

The alarms generated by PlantWatch can be divided into 2 groups:

- the repeating of alarms generated by the instruments and received by PlantWatch via the serial network
- malfunctions or events diagnosed independently by PlantWatch (printer errors, modem errors, peripherals off-line, failed download of logs, etc....)

The alarms deriving from the instruments are "produced" by PlantWatch based on a list of templates; each type of instrument must have a corresponding template in the PlantWatch memory. For each category of controller (IR32, MPX,...), PlantWatch decides the alarm variables (digital only) and, on each positive or negative transition, generates respectively an alarm event or alarm over. The configuration template can only be created and edited using the *PlantWatch Manager* configuration program.
The alarms are signalled instantly by the local devices, that is, displays, red LEDs and buzzers, while remote signalling devices, that is, fax, SMS, data call to service centre and relay activation, are either delayed or not activated, according to the category assigned to the alarm.
In fact, each alarm is entered immediately in the event log, while the remote device is called only if the alarm remains active for a period longer than the delay time corresponding to the category that the alarm belongs to (see following paragraph).

5.1.1 Alarm categories

Each alarm, according to how serious it is, can be attributed to a different category for remote signalling. The categories differ in terms of the duration of the remote signalling delay:

Category	**Default delay**	**Delay configuration**
Local signal only	----	
Immediate	1 minute	fixed
Fast delayed	1 minutes	using "PlantWatch manager"
Slow delayed	30 minutes	using "PlantWatch manager"

The categories can only be assigned to each alarm generated by the Carel peripherals using the "PlantWatch manager" configuration program. This also allows the category of the peripheral off-line alarms and printer error alarms to be modified.

Alarm	**Default category**
Peripheral off-line	Immediate (1 minute + detection time)
Printer not ready or RS485 printer module off-line	Immediate (1 minute + detection time)

Furthermore, there is another category of alarms which, due to their seriousness, can only be assigned to the immediate category (1 minute):

space available for variable log less than 20%: the memory available for saving the logs is almost full due to the failed download in automatic mode at 30%
space available for variable log equal to 0: the memory available for saving the logs is full; the new data is already deleting parts of the log not yet saved by downloading or printing
peripheral type error: this may arise due to an error in the configuration of the type of unit connected, for example, an IR universal instead of an IR for refrigeration.
modem initialisation error: this alarm is generated when PlantWatch cannot initialise the modem 5 consecutive times. It may be generated when starting PlantWatch, or alternatively when the modem is periodically re-initialised (every 20 minutes).

clock error: this is a serious internal malfunction relating to the reading of the clock
flash memory error: this is a serious internal malfunction relating to the operating parameters or the saving of the logs.

5.2 Alarm display and management

The presence of at least one active alarm is signalled by the flashing of the red LED. If the alarm has been generated by a peripheral (instrument or printer module), the symbol on the main screen relating to the peripheral in question flashes. In the event where all the alarms are over, the LED remains on. It will turn off only if the user enters the display of the alarm/event log.

The alarm button has the following functions, depending on the status of the buzzer and the presence or otherwise of active alarms:

Alarm status	**Action**
Active alarms and buzzer on	pressing once silences the buzzer pressing again displays the active alarm log
Active alarms and buzzer disabled	pressing once displays the active alarm log
Active alarms and alarm relay activated	pressing for 3 seconds disables the relay
No active alarms and red LED stays on	displays the alarm/events log (all), scrolling limited to backwards, so as to show only the events occurring after the last display; turns off the red LED
No active alarms and red LED off	the text “no alarm” is displayed

The alarm log can also be displayed from the “*display event log*” menu, by selecting “All”, the entire list of alarms can be scrolled in chronological order, without limits, while selecting “*only active*” limits the scroll to the active alarms only.
The alarms are saved to the log and printed, if activated, upon being received from the instruments, or at the moment of generation for events managed internally by PlantWatch.
The ***buzzer*** activation mode can be selected. The buzzer can be disabled, enabled with automatic silencing after a set time, or alternatively enabled to remain on whenever there is at least one active alarm or until the operator presses the alarm button.

5.3 Disabling alarms for maintenance

PlantWatch allows the alarms generated by a specific instrument to be temporarily disabled during the maintenance of the controlled unit (e.g. cleaning). The alarms must be re-enabled by the user when the unit returns to service. A safety timer re-enables the alarms 48 hours after disabling. This delay can be set using the *PlantWatch manager* configuration program. In the event of power failures affecting PlantWatch, the re-enabling time is counted from when power returns to the device .
This operation can be performed from the screen that displays the values read by the instrument, by pressing the Prg and “Alarm” buttons together for 3 seconds; a beep of the buzzer and a message confirm the command, and a flashing “X’ will appear in the place of the “:” following the address of the unit. The disabled alarms status is also displayed on the main screen by an x inside the symbol corresponding to the unit in question.
To re-enable the alarms, simply repeat the operation described above. If this action is performed when there are active alarms, a corresponding message will be displayed to warn the operator of this situation.
Each intervention by the user to disable/enable the alarms is recorded in the event log.

6. VARIABLES LOG

6.1 Characteristics

Using the PlantWatch log management, any variable from a *Carel* instrument read by the supervisor can be saved, be it *analogue* (probe temperature, fan speed, pressure etc....), *integer* (time parameters, percentages, etc....) or *digital* (status of the compressors, the solenoids, the alarms or the door).
The choice of which variables to save and the type of sampling performed for each of these is linked to the *template* that describes the instruments. The *templates* can be only be created and modified using the *PlantWatch manager* configuration program.
In PlantWatch and the log management configuration program the analogue and integer variables have been unified, therefore, in this manual, reference is only made to "analogue variables".
The information saved can be used for a variety of purposes: for example, to record the trend over time of temperatures in refrigeration cabinets, check for the presence of intermittent faults, analyse energy consumption etc....

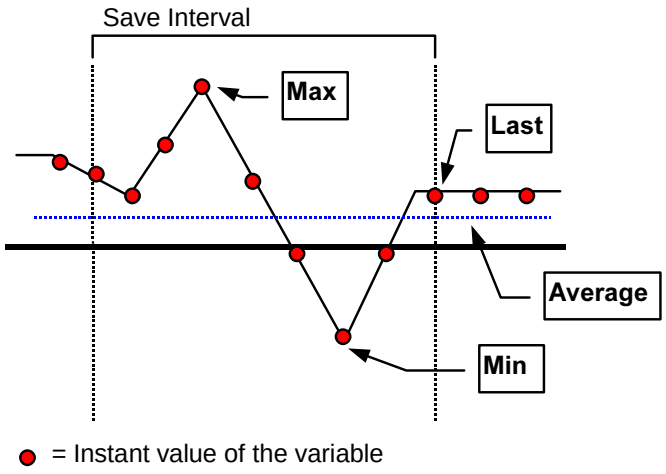
6.2 Operation

To optimise the saving of the data, in PlantWatch the variables have been divided into three groups: *low frequency analogue (LF)*, *high frequency analogue (HF)* and *digital (DIG).* These feature sampling frequencies that can be set independently.
The data is saved in "circular" mode, that is, overwriting the older data when no more space id available. PlantWatch, nonetheless, tells the user by a pre-alarm when the free space is less than 20% of the total. A second alarm is activated when the available space is equal to zero. In this situation, the older data that has not yet been stored on file, is deleted.

6.2.1 Memory full signal

PlantWatch has an internal variable that measures, as a percentage, the free space available to save the variables log. The local operator or the service centre are consequently warned when the corresponding memory available is nearly full. To do this, PlantWatch can generate an alarm to warn the service centre or the local operator of the need to download the log.
In the case of a service centre with permanent modem connection, PlantWatch can perform the download automatically by calling the service centre computer before the alarm is activated. Once the transfer is complete, the free space indicator is automatically reset.
By suitably setting the "download frequency" parameter, the service centre can be called on a regular basis at a greater frequency than the time it takes to fill the memory, so that the data on the PC corresponds to the required frequency.
The log may also be downloaded to the printer only; in this case, the memory full indicator is reset when the report is printed, both when started by the operator and automatically.
To ensure the continuity of the reports printed over time, the indicator is reset only if the reports are adjacent, that is, the data in the first sample of the current report immediately follows (or precedes) that in the last sample of the previous report.

6.2.2 Acquisition of analogue variables



As the value of the analogue variables may change significantly (for example, the temperature of an evaporator) during the recording interval, PlantWatch allows the value of greatest interest to the user to be saved for each variable, that is:

"***Average***": Saves the arithmetic average of the instant values
"***Min***": Saves the minimum value of the instant samples
"***Max***": Saves the maximum value of the instant samples
"***Last***": Saves the last instant value

6.2.3 Acquisition of digital variables

The digital variables are always saved by "forced variation", that is, if in the previous sampling period "0" was saved, and during the sampling period the value "1" was acquired at least once, then "1" will be saved, irrespective of the value that the variable had at the end of the period, and vice-versa.

6.2.4 Number of variables that can be saved

Any number of variables can be saved, within the following limits:

Total maximum number of variables saved	100
Maximum number of digital variables	64
Maximum number of "slow" analogue variables	64
Maximum number of "fast" analogue variables	64

If 64 slow analogue variables are used, 36 digital variables and no fast analogue variables can be used.

6.2.5 Recording time

PlantWatch, in the standard configuration as described in the following table, can record data for a total of 19 days.

Type		N° of variables	Sampling interval
LF	Low Freq. Analogue	32	10 minutes
HF	High Freq. Analogue	4	5 minutes
D	digital	64	30 seconds

When PlantWatch is configured with a number of variables or a sampling time other than the values described in the table, the maximum recording time varies from the expected 19 days. It will increase as the number of variables decreases or the sampling interval increases, and will decrease in the opposite cases.

All the variables belonging to a group are sampled at the same instant, and thus also share the same maximum recording time.

The sampling intervals for the 3 groups can be set using the *PlantWatch Manager* program or alternatively from the PlantWatch menu.

The following table shows the recording times achieved according to the variables used:

	Number of variables	Type		Interval	Minimum time (days)
A	32	LF	low frequency analogue	10 min	19.5
	1	HF	high frequency analogue	600 sec	113
	64	D	digital	20 sec	13.5
B	32	LF	low frequency analogue	10 min	19.5
	4	HF	high frequency analogue	300 sec	14
	64	D	digital	30 sec	20.2

The minimum time refers to the group. The calculation that PlantWatch performs internally to indicate the free space is based on the group with the minimum duration.
In the example shown in the table, in case **A** the recording time used for the calculation corresponds to the digital group, that is, 13.5 days, in case **B** it corresponds to the high frequency analogue group, that is, 20.2 days.

For general use, the following diagram is provided, which allows the total recording time to be estimated based on the number of variables used. A sampling interval of 300s is assumed.

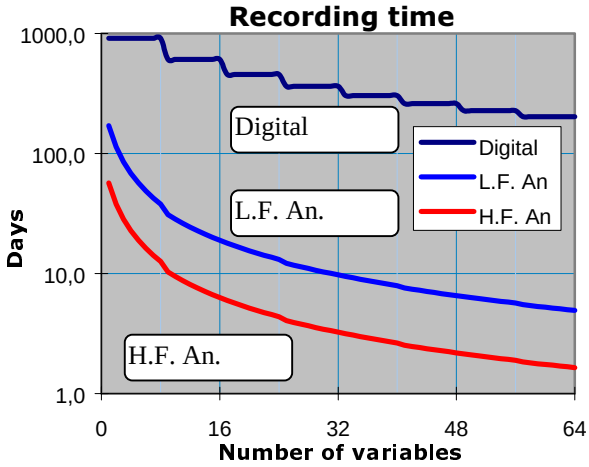


Fig. 1: Total recording time according to the number of variables (sampling interval 300s)

To determine the total sampling time, the following points should also be considered:

The areas of memory reserved for the three types of variables are separate, and thus the total recording times are different for each of these. In any case, the free space returned is the lesser of the three.
Modification during the operation of the instrument of parameters that affect the operation of the logs, such as the current time or the sampling time, may decrease the total recording time remaining.

6.3 Keypad commands

Request free space:
The free space remaining in the logs can be called as follows :
From the main screen, press the button "U" repeatedly until the "info" screen appears
Choose "Logs". The screen "Variable log - free space" will be displayed, indicating the percentage of space remaining.
This value is automatically shown as "100%" when the data is downloaded by the service centre, printed completely, or alternatively by the user from the setup->maintenance menu.

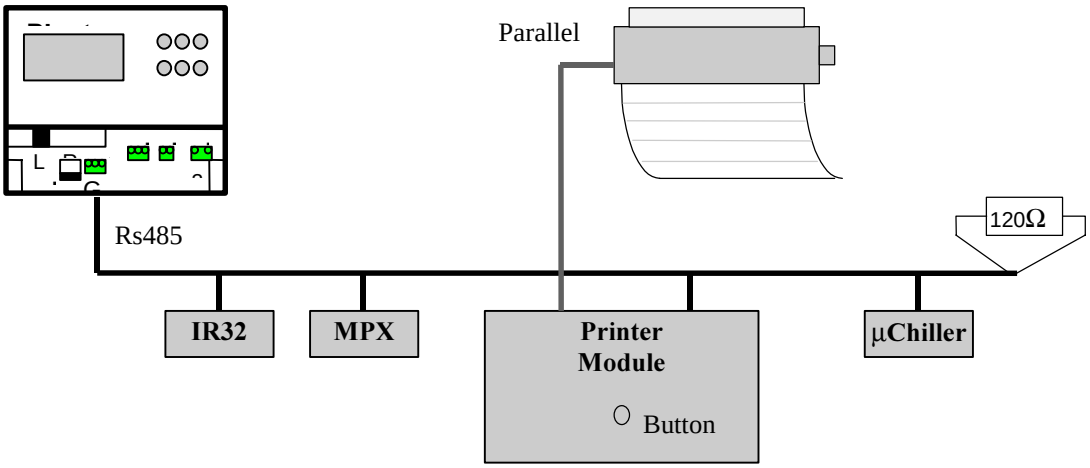
Deleting the logs:
To delete all the logs:
From the main screen, press the "prg" button for three seconds and enter the configuration password
Choose "Maintenance" and then "Delete Variables log". Confirm when requested.
(Note: the delete process may take a few minutes).

6.4 Configuration from the PC

The configuration of the controlled variables is handled by the *PlantWatch Manager* program. For the use of this program please refer to the corresponding manual.
NOTE: changing the configuration of the variables or the number and type of instruments configured will delete all the previously saved data logs.

7. PRINTER MANAGEMENT

PlantWatch can be connected to a parallel printer, using the PLWPPRD00/ PLWPPRT00 module.
This module can be connected to any point of the RS485 network that connects PlantWatch to the Carel instruments.



7.1 Print formats

The following types of reports can be printed:

Alarms/events when requested by the operator, with the possibility to select the events required by specifying the start and end time and date for the report being generated
Alarms/events in real-time (that is, as they occur)
Instant values of the variables featured for the log
Daily variables log when requested by the operator, with the possibility to select the day and sampling period required
Grouped daily variables log when requested by the operator, with the possibility to select the day required
Weekly variables log when requested by the operator, with the possibility to select the week required

The reports from 3 to 6 may also be generated automatically at the end of the set period or at the required time.
In this way, timed reports may represent the complete log, in paper form, of the sampled variables. For this purpose, the memory full alarm can be enabled so that it is linked to the correct printing of the report.

The button on the printer module can also be associated to one of the above reports, activating it when pressed. In this way, the required report can be printed from a position near the printer, without having to access PlantWatch.

(3) - Instant value report:

```
15/09/2000 13:53 Installation name

Current value report

1: LT Cabinet                  Probe temperature:   12.0
1: LT Cabinet           Defrost probe temperature:   -10.0
2: Frozen food island          Probe temperature:   (-17.0)
2: Frozen food island   Defrost probe temperature:   -18.3
3: Frozen food cabinet         Probe temperature:   *****
```

On the instant value report, the first line from the top shows the date and time the report was printed, and thus the time the values refer to. This is followed by the list of variables, with each line being made up of:

Serial address of the instrument: description of the instrument + name of the variable: value

If the field value is in brackets (-17.0), it means that at the moment of printing the instrument was off-line, and the value refers to the last reading effected. If the value field is replaced by asterisks, it means that the variable has never been acquired by the peripheral.

(4) - Daily variables log report:

```
15/09/2000 13:53 Installation name                                  Page: 1/4
10/09/2000 1: LT cabinet temperature probe
         0'      10'      20'      30'      40'      50'
---|------------------------------------------------------------------------
  0|  -----    -----    -----    -----    -----    *****
  1|  -21.3    -21.1    -21.0    -20.7    -20.2    -20.0
  2|  -20.0    -19.9    -19.9    -19.5    -19.7    -19.9
  3|  -20.0    -20.1    -20.5    -20.7    -20.8    -21.0
  4|  -21.3    -21.1    -21.0    -20.7    -20.2    -20.0
  5|  -20.0    -19.9    -19.9    -19.5    -19.7    -19.9
  6|  -20.0    -20.1    -20.5    -20.7    -20.8    -21.0
  7|  -21.3    -21.1    -21.0    -20.7    -20.2    -20.0
  8|  -20.0    -19.9    -19.9    -19.5    -19.7    -19.9
  9|  -20.0    -19.9    -19.9    -19.5    -19.7    -19.9
 10|  -20.0    -19.9    -19.9    -19.5    -19.7    -19.9
 11|  -20.0    -19.9    -19.9    -19.5    -19.7    -19.9
 12|  -20.0    -20.1    -20.5    -20.7    -20.8    -21.0
 13|  -21.3    -21.1    -21.0    -20.7    -20.2    -20.0
 14|  -20.0    -20.1    -20.5    -20.7    -20.8    -21.0
 15|  -21.3    -21.1    -21.0    -20.7    -20.2    -20.0
 16|  -20.0    -20.1    -20.5    -20.7    -20.8    -21.0
 17|  -21.3    -21.1    -21.0    -20.7    -20.2    -20.0
 18|  -20.0    -19.9    -19.9    -19.5    -19.7    -19.9
 19|  -20.0    -19.9    -19.9    -19.5    -19.7    -19.9
 20|  -20.0    -20.1    -20.5    -20.7    -20.8    -21.0
 21|  -21.3    -21.1    -21.0    -20.7    -20.2    -20.0
 22|  -20.0    -20.1    -20.5    -20.7    -20.8    -21.0
 23|  -21.3    -21.1    -21.0    -20.7    -20.2    -20.0
```

The daily report shows the values of a determined variable for the entire day, at the specified sampling interval. The values allowed are 10, 15 and 30 minutes.
Each page contains the report for 2 variables.
The dashes "-----" mean that no value was saved at that moment, that is, PlantWatch was off or alternatively the value is no longer present in the log.
If, on the other hand, the string "*****" is printed, it means that the variable was saved but the value was not acquired by the peripheral, or alternatively the peripheral was off-line.
The string "?????" indicates the attempt to print variables that are not entered in the log, while "!!!!!" indicates a serious error in the recording of the data.
The sampling period can be set between 10 and 30 min.

(5) - Grouped daily variables log report:

```
15/09/2000 13:53 Installation name                                  Page: 1/4
10/09/2000 1: LT cabinet temperature probe
        1:A      1:B      2:A      2:B      2:C     3:A       3:B      4:A
---|-------------------------------------------------------------------------
  0|  -----    -----    -----    -----    -----    *****    -19.9      6.9
  1|  -21.3    -21.1    -21.0    -20.7        1    -20.0      6.7
  2|  -20.0    -19.9    -19.9    -19.5        1    -19.9    -20.1      6.6
  3|  -20.0    -20.1    -20.5    -20.7        1    -21.0    -20.3      6.3
  4|  -21.3    -21.1    -21.0    -20.7        1    -20.0    -20.0      6.0
  5|  -20.0    -19.9    -19.9    -19.5        1    -19.9    -20.1      5.5
  6|  -20.0    -20.1    -20.5    -20.7        0    -21.0    -19.8      5.4
  7|  -21.3    -21.1    -21.0    -20.7        0    -20.0    -19.7      5.1
  8|  -20.0    -19.9    -19.9    -19.5        0    -19.9    -19.6      5.4
  9|  -20.0    -19.9    -19.9    -19.5        1    -19.9    -19.6      5.5
 10|  -20.0    -19.9    -19.9    -19.5        1    -19.9    -19.7      5.4
 11|  -20.0    -19.9    -19.9    -19.5        0    -19.9    -19.8      5.3
 12|  -20.0    -20.1    -20.5    -20.7        0    -21.0    -19.7      5.2
 13|  -21.3    -21.1    -21.0    -20.7        0    -20.0    -19.1      5.1
 14|  -20.0    -20.1    -20.5    -20.7        1    -21.0    -18.8      5.0
 15|  -21.3    -21.1    -21.0    -20.7        1    -20.0    -19.1      5.0
 16|  -20.0    -20.1    -20.5    -20.7        1    -21.0    -18.8      5.1
 17|  -21.3    -21.1    -21.0    -20.7        0    -20.0    -19.1      5.3
 18|  -20.0    -19.9    -19.9    -19.5        0    -19.9    -18.8      4.9
 19|  -20.0    -19.9    -19.9    -19.5        1    -19.9    -20.0      4.5
 20|  -20.0    -20.1    -20.5    -20.7        1    -21.0    -20.1      4.4
 21|  -21.3    -21.1    -21.0    -20.7        0    -20.0    -20.2      4.3
 22|  -20.0    -20.1    -20.5    -20.7        0    -21.0    -20.5      4.2
 23|  -21.3    -21.1    -21.0    -20.7        1    -20.0    -20.9      4.2


Key
 1:A  = LT Cabinet 1 - Probe temperature
 1:B  = LT Cabinet 1 - Defrost probe temperature
 2:A  = Frozen food island 1 - Probe temperature
 2:B  = Frozen food island 1 - Defrost probe temperature
 2:C  = Frozen food island 1 - compressor status
 3:A  = Frozen food cabinet 1 - Probe temperature
 3:B  = Frozen food cabinet 1 - Evaporator temperature
 4:A  = Frozen food cabinet 2 - Probe temperature
```

The grouped daily report shows the values of a series of variables on the same page for the entire day, at a set sampling interval of 1 hour. The symbols are the same as described for report 4 above.
The values of the variables are grouped into columns, each column represents the temperature trend for the day at 1 hour intervals. Each page of the report can print up to 8 variables.

(6) Weekly variables log report

```
15/09/2000  9:00 Installation name                                  Page: 1/4
11/09/2000 1: LT cabinet temperature probe
      Mon      Tue      Wed      Thu       Fri      Sat      Sun
---|-------------------------------------------------------------------------
  0|  -21.7    -23.4    -20.3    -20.0    -19.4    -18.7    -18.7
  1|  -21.3    -21.1    -21.0    -20.7    -20.2    -20.0    -19.7
  2|  -20.0    -19.9    -19.9    -19.5    -19.7    -19.9    -19.1
  3|  -20.0    -20.1    -20.5    -20.7    -20.8    -21.0    -18.7
  4|  -21.3    -21.1    -21.0    -20.7    -20.2    -20.0    -18.9
  5|  -20.0    -19.9    -19.9    -19.5    -19.7    -19.9    -19.0
  6|  -20.0    -20.1    -20.5    -20.7    -20.8    -21.0    -19.1
  7|  -21.3    -21.1    -21.0    -20.7    -20.2    -20.0    -19.2
  8|  -20.0    -19.9    -19.9    -19.5    -19.7    -19.9    -19.3
  9|  -20.0    -19.9    -19.9    -19.5    -19.7    -19.9    -19.5
 10|  -20.0    -19.9    -19.9    -19.5    -19.7    -19.9    -19.7
 11|  -20.0    -19.9    -19.9    -19.5    -19.7    -19.9    -19.9
 12|  -20.0    -20.1    -20.5    -20.7    -20.8    -21.0    -20.0
 13|  -21.3    -21.1    -21.0    -20.7    -20.2    -20.0    -20.1
 14|  -20.0    -20.1    -20.5    -20.7    -20.8    -21.0    -19.9
 15|  -21.3    -21.1    -21.0    -20.7    -20.2    -20.0    -19.7
 16|  -20.0    -20.1    -20.5    -20.7    -20.8    -21.0    -19.1
 17|  -21.3    -21.1    -21.0    -20.7    -20.2    -20.0    -19.2
 18|  -20.0    -19.9    -19.9    -19.5    -19.7    -19.9    -19.3
 19|  -20.0    -19.9    -19.9    -19.5    -19.7    -19.9    -19.0
 20|  -20.0    -20.1    -20.5    -20.7    -20.8    -21.0    -19.7
 21|  -21.3    -21.1    -21.0    -20.7    -20.2    -20.0    -20.0
 22|  -20.0    -20.1    -20.5    -20.7    -20.8    -21.0    -20.5
 23|  -21.3    -21.1    -21.0    -20.7    -20.2    -20.0    -20.6
```

The weekly report shows the value of an individual variable for 7 days, at a set sampling interval of 1 hour. The symbols are the same as described for report 4 above. Each page contains the report for 2 variables.

7.2 Automatic printing

PlantWatch can automatically print the events, the instant value report, the daily log and the grouped daily log.
The ***events report*** is printed in real-time, at the moment the events occur the line describing the event is sent to the printer, and thus the list produced appears in increasing chronological order. If a laser printer is used, the sheet will not be printed until a page is completed (66 lines), or unless the operator pushes the printer page feed button.
The request to print a report sent by the operator or activated automatically at a set time, in the case where events have already been printed, is preceded by a page break, in order to align the report at the start of the sheet.
The set time printing of the ***instant value report*** is performed at the interval specified, at a time that depends on the current interval set.

Set interval	**Print time**
15 minutes	at 00,15,30,45 minutes each hour
30 minutes	at 00,30 minutes each hour
45 minutes	at 00:00, 00:45, 00:30, 01:15, 2:00, etc....
1 hour	at 00:00, 01:00, etc....
1.5 hours	at 00:00, 01:30, 03:00, etc....
2 hours	at 00:00, 02:00, 04:00, etc....
4 hours	at 00:00, 04:00, 08:00, etc....
8 hours	at 00:00, 08:00, 16:00.
12 hours	at 00:00, 12:00
24 hours	at 00:00

The set time printing of the ***daily log*** is performed at the time specified and at the display interval specified in the set-up. The values allowed are 10, 15 and 30 minutes. The log refers to the day before the current day.

The set time printing of the ***grouped daily log*** is performed at the time specified and at a set display interval of 1 hour. The log refers to the day before the current day.

The set time printing of the ***weekly log*** is performed at the time and on the day specified in the set-up. The log refers to the week before the day the report is printed. Make sure that duration of the log is longer than 1 week.

8. REMOTE SIGNALLING

The remote signals involve faxes, SMS messages, calls to the service centre and activation of the relay, and are effected only when at least one alarm remains active for a time greater than the delay set for the corresponding category.

8.1 FAX transmission

8.1.1 Creation of the fax

The fax is transmitted only when the remote signalling condition exists and the following 2 conditions are satisfied:

at least ½ hour has elapsed since the transmission of the previous fax
at least 1 minute has elapsed without remote-signal alarms being activated, or alternatively there are more than 32 active

This type of filtering prevents repeated faxes being sent containing “similar” information.
The following is the format of the fax sent in response to one or more alarm condition:

```
PLANTWATCH FAX ------------------>  Date/time:  9/06/2000   8:32
--------------------                From:       Shopping centre ID:126
                                    To:         0413434344
Alarm report

09/06/2000  8:19 <!> <*> 0:10 3: Meat cabinet    Off-line
09/06/2000  8:18 <!> <*> 1:12 1: Veg. display    High temperature
09/06/2000  8:17              2: Fruit display   Off-line
09/06/2000  8:10 <!>          3: Meat cabinet    Off-line
08/06/2000 18:08              1: Veg. display    low temperature
07/06/2000 10:08              1: Veg. display    Off-line
07/06/2000 10:00            PW: Restart
<!>=Active alarms <*>=Serious alarms, duration (hh:mm)


Current value report
1 Veg. display    Evap temperature :      -22.1
2 Fruit display   Evap temperature :      -15.8
3 Meat cabinet    Evap temperature :      (-10.5) Off-line
```

The list of alarms is compiled in reverse chronological order, from the more recent to the oldest, copying from the PlantWatch internal log only the start alarm events, while the signal-only events and end alarm events are ignored, except for the PlantWatch reset.
The alarms that are still active at the moment the fax is transmitted are printed preceded by the symbol <!>, while those which, due to their seriousness or duration over the set delay time, have brought about the sending of the fax, that is, have become remote-signal alarms, are also preceded by the symbol <*>, and this symbol is followed by a number that indicates the duration of the alarm in hours and minutes; if the alarm has been or is active for more than 18 hours, the indication “>18” is displayed.
If after the activation of the remote signalling condition the alarms that caused such condition are over, the fax will still be sent, without indicating any active alarms.
A maximum list of 35 alarms is sent, to leave space for the report of the variable values read at the moment the fax is sent.
The heading of the fax includes the date and time of transmission, the name of the installation, the installation code and the telephone number of the fax recipient. The installation code is the number used by the data processing centre (supervisor) to identify the PlantWatch system that has performed the call.

8.1.2 Call management

The fax calls are made to the numbers entered during configuration. The logic used to manage the calls can be configured; this can be *forced*, in which case the fax is always sent to all the numbers entered, or *conditional.* Conditional configuration allows the fax to be sent to recipient B only if A does not answer, or alternatively to C only if B does not answer. See the corresponding parameters on the screen *m5*.

Before a call is considered as having failed, six attempts are performed in the following sequence:

Attempt	pause of wait towards the same number
1	
2	20 seconds after the 1st
3	1 minute after the 2nd
4	1 minute after the 3rd
5	2 minutes after the 4th
6	4 minutes after the 5th

Table. 7.1.2.1

Calls to any other fax numbers entered or the data centre are made during the delay between one attempt and the next.

8.2 Send SMS

The SMS message is sent as soon as the remote-signal alarm condition is activated. Each individual alarm event produces an SMS message.
The SMS is sent to the 3 recipients is always *forced,* in that, unlike the fax, where the receipt of the message by a determined number can be confirmed, for the SMS this is impossible, as the confirmation always comes from the service centre, and it makes no sense to manage calls to alternative numbers.

8.2.1 Send SMS using the GSM modem

The GSM modem immediately sends the message as soon as a remote signal alarm condition occurs. The send is considered as having been performed if the network operator's server confirms reception; in the event no confirmation is received, a further 5 attempts are made to send the message, at 30 second intervals. If the message can not be sent, a failed SMS send event is generated. The *identifier* of the message received on the cellular phone is always the number of the caller, in this case, the telephone number associated to the SIM card in the GSM modem.

8.2.2 Send SMS using the telephone line (PSTN) modem

The SMS can be also sent using an internal or external PSTN modem. In this case, the messages are sent by connecting to a service centre that effectively transfers the message to the GSM network. The PlantWatch supports the TAP and UCP protocols, which are the most commonly used transmission standards internationally. These standards also allow connection to service centres for sending text messages to pagers. The message is transmitted in two phases: in the first phase, the call is made to the service centre, the telephone number of which needs to be configured using the screen *m8*, while in the second phase the message is transmitted to the service centre. The SMS message is considered as having been delivered when the centre sends the confirmation code. The effective receipt of the message may take a number of hours, and will only occur if the operator of the centre has stipulated a roaming agreement with the network operator of the recipient of the message. If this is not the case, the message may be confirmed by the centre even if the operator has not sent it to the recipient. If the send fails, PlantWatch makes repeated attempts to send the message, according to the times described in the paragraph *Fax Transmission - Call Management* **Table. 7.1.2.1.** Calls to fax numbers or the data centre are made during the delay between one attempt and the next. The identifier of the message received on the cellular phone depends on the type of protocol used to connect to the service centre. In the case of the UCP protocol, PlantWatch sets this value as numeric code of the installation; see the corresponding parameter on screen *g1*. In the case of the TAP protocol, the value of the identifier can not be set, and it therefore takes the standard code set by the service provider.

The cellular phone numbers of the recipients should be entered with or without the international access code, according to the requirements of the operator. When the configuration requires the UCP protocol, the international access code "+" is translated by the PlantWatch software into the sequence "00", as the standard only allows numeric characters; in the other cases, the numbers must be entered in the format "0039....." rather than "+39....", unless otherwise specified by the operator.

8.2.3 Format of the SMS messages

The SMS messages are received by the cellular phone accompanied by the date and time of the message. The latter refers to the moment when the network operator's server receives the message. The effective delivery of the message to the recipient's phone depends on the traffic on the network (it may even be delayed by a number of hours).
The format of the messages is the following:

PW: "Installation name" "installation code" ("Number of active alarms"!) →
"Start alarm date and time" ["Duration of the alarm hh:mm"]
"Alarm description"

Item	Description
Installation name	Alphanumeric name of the installation
Installation code	Numeric identifier (address)
Number of active alarms	As for the Fax, this is a counter that indicates the number of active alarms at the moment the message is sent
Start alarm date, time	Instant at which the alarm occurs
Duration of the alarm	Duration of the alarm in the format hh:mm; if the duration exceeds 18 hours, the text [>18h] is indicated
Alarm description	The description of the alarm is in the same format used on the display and in the faxes, that is: • in the case of an alarm generated by a peripheral Alarm description = *nn: "peripheral name" "alarm"* Where: *nn* physical address of the peripheral *peripheral name* name assigned to the peripheral by the user during configuration *alarm* name of alarm variable • in the case of an internal event/alarm PW: "alarm/event description"

8.3 Call to the data centre

The calls to the data centre are made by PlantWatch when the remote signalling conditions exist (see Chap. *Alarm management*). The purpose of the call is to transfer the updated alarm log to the centre.
PlantWatch also calls the centre to download the *variables log*. The latter call is made when the remaining space for saving the variables log falls below 30% of the space available. If the call and the download operation are successful, PlantWatch considers the free space as being 100%. If PlantWatch cannot perform the download before the space falls below 20%, a serious alarm is generated, and this is signalled by fax and/or SMS and the activation of the alarm relay; a second alarm notifies the user when the space reaches zero and the data not yet stored will be irreversibly lost.
The variable that indicates the space occupied can only be reset if the password sent by the remote PC allows its authorisation. This ensures that any other computers making the call can download the log resident in PlantWatch without compromising the continuity of the procedures for saving the logs to the centre's PC.
All calls for other reasons from PlantWatch to the authorised centre and vice-versa include the downloading of the data and the setting of the free space to 100%.

8.4 Activation of the relays

The relay is activated by PlantWatch when the remote signalling condition exists (see par.5*)*. The configuration parameters allow the relay activation logic to be modified between normally energised and normally de-energised. It is also possible to set the relay activation time for single-location operation or alternatively choose fixed activation.
Pressing the "Alarm" button for more than 3 seconds deactivates the alarm relay.

9. PARAMETERS AND CONFIGURATION PROCEDURE

9.1 Parameter programming

The parameter programming procedure is accessed by pressing the *Prg* button for 3 seconds. The various levels of parameters are accessed by entering different passwords.
The parameters that can be modified from the user interface are divided into 3 levels, so as to guarantee maximum security and user friendliness for less expert users. The display of the parameters depends on the level of password entered; the highest level password, level 3, allows both the parameters and the passwords to be modified.
The parameters are grouped into screens according to function and the priority. The screens belonging to levels higher than that accessed by the password entered are not displayed.

Level	Description	Code
1	Maintenance	Man
2	User configuration	Cfg1
3	Installer configuration	Cfg2

The configuration procedure can be exited by confirming the modifications on the following screen, accessed by pressing the *Prg* button.

Update Parameters Save and exit? No

Alternatively, the procedure can be exited without confirming the modifications by pressing the *Esc* button for 3 seconds. The modifications are also cancelled after 60 seconds of inactivity (no button pressed).

Please remember that any modifications to the configuration corresponding to the network of the connected peripherals, number of peripherals and type of peripherals, but not the names, automatically deletes the variables log. As a result, if the data saved needs to be stored, download or print the variables log before making the required modifications.

9.2 List of parameters

The following list includes all the PlantWatch operating parameters, some of which can be modified only using the *PlantWatch manager* configuration program: these are marked by the code PC in the screen code column.

	Screen code	Description	Level	Type	Default	Min/Max
	a1	Buzzer activation time or disabling	2	minutes	1 min	disabled 1-20min continuous
	a1	Alarm relay activation time	3	seconds	10 sec	disabled 1 sec 20 sec continuous
	a1	Activation of the printer board alarm relay (Prn relay)	3	flag	no	
	a2	Alarm relay logic, norm. energised/norm de-energised	3	flag	norm de-energ.	
	a2	Function of second relay	3	flag	reset modem	Reset modem Alarms serious
	a3	Low freq analogue sampling period	3	minutes	10 min	1 min 120 min
	a3	High freq analogue sampling period	3	seconds	10 sec	1 sec 60 sec
	a3	Digital sampling period	2	seconds	20 sec	5 sec 300 sec

	Screen code	Description	Level	Type	Default	Min/Max
	a4	Variables log: log full alarm	3	flag	Enabled	Enabled Disabled
	a5	Variables log: reset free space indicator	3	flag	Serial download	Serial download Print report
	g1	Installation name	2	string	Pwatch	
	g1	Installation code	2		1	1-65535
	g2	Type of unit for instrument configuration	3	flags		Ir32, Ir32c...
	g2	unit category X 32	3	flags	-	List of names
	g2	unit description X 32	3	flags	-	List of names
	g2	unit progressive no. X 32	3		0	1÷32
	g3	self-configuration mode activation	3	flag	disabled	
	g4	Baud rate used on RS485 serial line to peripherals	3	Baud	19200	1200÷19200
	g5	level 1 access password	3		0001	0÷65535
	g5	level 1 user name	3	string	“User1”	
	g5	level 2 access password	3		0002	0÷65535
	g5	level 2 user name	3	string	“User2”	
	g5	level 3 access password	3		0003	0÷65535
	g5	level 3 user name	3	string	“User3”	
	g6	status screen rotation activation	2	flag	Disabled	Enabled Disabled
	L1	Language selection	2	flags	English	English Italian German French Spanish
	m1	Serial port mode, internal modem/external modem/direct serial connection	3	flags	internal modem	No modem internal modem external modem
	m1	Number dialling pulse/tone	3	flag	Tone	Tone / Pulse
	M1	Modem type	3	flags	PSTN	PSTN GSM Type 1 GSM Type 2
	m2	data processing centre telephone number	2	string		
	m2	enable data processing centre telephone number	2	flags	Disabled	Enabled Disabled
	m3	data processing centre access password	3	number	00004	
	m3	data processing centre access user name	3	string	“RemoteUser”	
	m4	Enable call to data processing centre to send alarms	3	flag	Disabled	Enabled Disabled
	m4	Enable call to data processing centre to download variables log	3	flag	Disabled	Enabled Disabled
	m5	fax number 1	2	string	0000...	
	m5	fax number 2	2	string	0000...	
	m5	fax number 3	2	string	0000...	
	m5	enable fax number 1	2	Assint	Disabled	-, A
	m5	enable or force fax number 2	2	Assint	Disabled	-,b,B
	m5	enable or force fax number 3	2	Assint	Disabled	-,c,C
	m7	PIN for GSM modem	3	string		
	m8	Enable SMS transmission	3	flag	Disabled	Enabled Disabled
	m8	Telephone number of the network operator’s SMS service centre	3	string	0000...	
	m9	Password for connection to TAP SMS service centre	2	string		
	m9	Baudrate for connection to SMS service centre	2	Baud	19200	1200-38400
	m9	Type of protocol for connection to SMS	2	flags	UCP	UCP-TAP

	Screen code	Description	Level	Type	Default	Min/Max
		service centre				
	m9	Parity for connection to SMS service centre	2	flags	None	None Odd Even
	m9	Number of bits for connection to SMS service centre	2	flag	8	7-8
	m10	Cellphone number of recipient A	2	string	0000...	
	m10	Cellphone number of recipient B	2	string	0000...	
	m10	Cellphone number of recipient C	2	string	0000...	
	m10	Enable number of recipient A	2	flag	Disabled	-, A
	m10	Enable number of recipient B	2	flag	Disabled	-, B
	m10	Enable number of recipient C	2	flag	Disabled	-, C
	ma1	clock set-up	1	data-hour		
	ma2	Delete events/alarms log command	3	flag		
	ma2	Delete variables log command	3	flag		
	p1	Presence of printer board	3	flag	Disabled	Disabled Enabled
	p1	Printer board button function	2	flags	Disabled	Disabled Values rep. Daily rep. Grouped daily rep. Weekly rep.
	p1	daily log print interval from printer board button	2	flags	10 min	10min 15 min 30 min
	p2	enable real-time event log print	2	flag	Disabled	Disabled Enabled
	p2	enable and frequency of periodical instant values report	2	flags	Disabled	------- 15 min 30 min 45 min 1 hour 1.5 hours 2 hours 4 hours 8 hours 12 hours 24 hours
	p3	enable and interval of daily log report	2	flags	10 min	---- 10min 15min 30 min
	p3	daily log print time	2	hours:mins	0:00	
	p4	enable grouped daily log report	2	flag	Disabled	Disabled Enabled
	p5	Enable and day of weekly log report	2	flag	Disabled	------ Sun Mon .... Sat
	p5	weekly log print time	2	hours:mins	0:00	
	PC	delay in slow delayed alarm signals for remote signalling	PC		1h	
	PC	delay in fast delayed alarm signals for remote signalling	PC		10 min	
	PC	peripheral disconnected alarm class (instant/fast/slow) for remote signalling	PC	flags	instant	

	Screen code	Description	Level	Type	Default	Min/Max
	PC	printer timeout alarm class (instant/fast/slow) for remote signalling	PC	flags	instant	
	PC	Alarm auto-reset time after user intervention for maintenance	PC	hours	48	
	PC	Analogue variable sampling mode maximum/minimum/average/instant X no. variables	PC			
	PC	Frequency of connection to service centre for download	PC	days	7	
	PC	External modem initialisation string (data mode)	PC	string	UsRob	
	PC	External fax initialisation string (fax mode)	PC	string	UsRob	
	PC	Non-standard languages	PC			
	Mplant Modi	Modification of instrument parameters	PC			

9.3 Description of the parameters

Selection screens

Maintenance configuration menu Password:00000

User: User3	>General
>Maintenance	>Fax-modem
>Parameters	>Printer
>Language	>Alarms/Logs

9.3.1 Maintenance

9.3.1.1 Clock set-up

ma1

Clock set-up Date: 3/11/2000 Time: 16:25

The fields allow the time and date of the internal clock to be set. The data is effectively updated when exiting screen; no confirmation is required. At the moment of the update the seconds are set to zero.

9.3.1.2 Delete event log

ma2

Delete event log Confirm: No

Confirming the corresponding field completely deletes the event/alarm log.

9.3.1.3 Delete variable log

ma3

Delete variab. log Confirm: No

Confirming the corresponding field completely deletes the variables log.

9.3.1.4 Reset free space indicator

ma3

Variables log Free space indic. Reset: No Free space 93%

Confirming resets the free space indicator. After this operation the free space will be considered as 100%. In this way, the memory full alarms are also reset. The data saved remains available for printing or downloading.

9.3.2 Parameters > General

g1	g2	g3	g4
Installation name: Technical department Installation code: 1	Unit cnf. add: 1 IR32C LT CABINET Vegetables 1	Auto unit conf. Start? No ----------	RS 485 baud rate 19200 Baud

g5	g6
Change password 1: 00001 User1 2: 00002 User2 3: 00003 User3	Status screen rotation Disabled

9.3.2.1 Installation name

This is a string of 20 characters that identifies the PlantWatch in text form. This name appears on all the reports, on the faxes, on the main screen of the PlantWatch, and is also sent to the data processing centre during each connection.

9.3.2.2 Installation code

The installation code is a number that uniquely identifies the installation; it is used, together with the *installation name*, by the software on the computer in the data processing centre to identify the incoming calls. This number must coincide with the address of the node configured on the MasterPlant.

9.3.2.3 Unit Configuration

Using the fields in the *Unit configuration* screen, the units present in the RS485 network can be configured.
Example

Unit cnf. add:	*add*
Type of unit	
Category	
Description	*NN*

Unit cnf. add:	1
IR32C	
LT CABINET	
Vegetables	1

The *address* field represents the physical address of the instrument, when changed, the other fields display the current setting of the selected instrument. The *type of unit* field is the more important of these, and determines the recognition of the unit and the correct management of the alarms. The unit types that can be selected are in fact the *"templates"* loaded in the PlantWatch flash memory (maximum 32). When PlantWatch leaves the factory, it contains all the types of Carel instruments that can be connected, with one *template* for each instrument. Using the "PlantWatch manager" program, these *templates* can be customised, and new ones created, according to the specific application (see Chap. Configuring PlantWatch using "PlantWatch manager"). The type of unit must always coincide with the model of Carel instrument effectively connected, if not, an alarm will be generated.
The *Category*, *Description* and progressive number *NN* fields represent the user name of the machine (refrigerated cabinet, cold room, air-conditioner, chiller, etc....), that will be referred to each time PlantWatch has to generate a message relating to that machine. PlantWatch contains a pre-set series of names which, when suitably combined, generate a sufficiently clear unit template. In any case, the "PlantWatch manager" configuration program allows specific names to be created.
Warning: modifying the installation's configuration data corresponding to the type, the address and the number of the peripherals connected leads to, for reasons of data coherence, the deleting of the variable log; therefore, all the logs saved must first be downloaded or printed.

9.3.2.4 Automatic unit configuration

This screen activates the unit self-configuration function. This procedure is very useful when configuring PlantWatch with the units already connected and operating. It offers the possibility to automatically set the *Type of unit* field in the previous screen based on the information received from the peripherals themselves. It is then up to the operator to set, on the previous screen, the names of the units (category, description). This procedure, during the scan phase, also searches for the presence of the printer board, and if found enables the printer presence flag (see corresponding configuration screens).
If, using the "PlantWatch manager" program, more than one *template* has been defined to describe the same unit, the procedure automatically selects the first one found.
If there is no *template* in the memory corresponding to the instruments installed, the character '?' will appear to indicate the addresses of the instruments that are not recognised.

9.3.2.5 RS485 baud rate

This parameter configures the speed that PlantWatch uses on the RS485 serial line; the standard baud rate is 19200, nonetheless, some instruments only use 9600 baud, and thus it is necessary to adjust PlantWatch to this value.

9.3.2.6 Change password

This screen allows a *password* and *username* to be set for the 3 levels of access envisaged in the PlantWatch user interface. This screen can only be accessed by the level 3 user.

Change password
1: 00001 User1
2: 00002 User2
3: 00003 User3

The *password* fields are numeric only and limited to a maximum value of 65536, while the *user name* fields are alphanumeric, with a maximum length of 11 characters.

9.3.2.7 Status screen rotation

Enabling this parameter sets the automatic rotation of the screens, see paragraph "Automatic rotation of status screens".

9.3.3 Parameters > FAX-Modem

m1	m2	m3	m4
Modem config. No Modem Dialling: Tone Type: PSTN	Data process centre Enable call: Yes 0499716698 Test call: No	Data process centre Change password User Pass.: 00004 RemoteUser	Data process centre Call to: Send alarms: No Download log: No
m5	**m6**	**m7**	**m8**
Fax configuration A:04371234567 b:0123456789 c:0123456789	Test call fax Fax service: A Test call: No	GSM modem config. PIN: 3241	SMS config. Enable SMS send: Yes SMS service centre +393492000200
m9	**m10**	**m11**	
SMS config. via PSTN Pass: Baud: 19200 UCP Parity: None Bits: 8	SMS recipients A:00393475272983 B:00393484427822 C:0039123456002	Send test SMS: SMS Rec.: A No	

9.3.3.1 Modem configuration

The modem configuration screen includes the fields for selecting the port used to manage the modem, selecting the dialling mode, pulse or tone, and configuring the type of modem. The options allowed for the port used are described in the following table:

Selection	Port used	Function	Note
No modem	RS232 serial	Direct supervisor connection in RS232 or for setup via serial	
External modem	RS232 serial	3Com-UsRobotics external modem	other model of modem can be used, modifying the initialisation strings using "*PlantWatch manager*"
Internal modem	Internal serial	This selection is operative only if the model of PlantWatch is PLW00M0000, for the other models, it is the same as selecting "External modem"	

For each selection, the baud rate is fixed and equal to 115,200 baud, no parity, 2 stop bits.
The possible options for the type of modem are PSTN or GSM Type 1 and GSM Type 2; PSTN is for modems using dial-up lines, while GSM is for cellphone modems, currently only the FALCOM A2, Siemens M20T and Wavecom WMOD2B can be connected. The settings are:

Type 1	Falcom A2 Wavecom WMOD2B ETM 9000
Type 2	Siemens M20T

The PSTN modems used must conform to the Hayes standard (AT.. commands) and support at least the V.34 (33600 baud) standard; the pre-set model is Us-Robotics, other brands and models can be used by modifying the initialisation commands for fax and data using "*PlantWatch manager*".

9.3.3.2 Data processing centre configuration

The parameters that need to be set are the overall enabling of the calls, and the telephone number of the centre.
The "Test call" field allows test calls to be made. Before making such calls, the configuration must be saved so that the parameters displayed coincide with those that are operative.
The calls to the centre can be made to notify alarms and to download the log. Both functions can be enabled separately.
The "Password" and "User" fields must be set to coincide with those of the MasterPlant or the "PlantWatch manager" configuration program. The right to access these are initially (default values) set to the maximum (all remote operations are accepted). Subsequently, the user may restrict the allowed actions using the configuration program.

9.3.3.3 Fax configuration

Fax configuration
A:04371234567
b:0123456789
c:0123456789

The parameters that need to be set are the enabling of the calls and the fax numbers to be called. Depending on the letter that appears in the right-hand field, the calls to the second (B) and third (C) fax number may be conditioned by the outcome of the transmission to the previous number, that is, C by B and B by A.

Indication in the right-hand field	**Action**
-	call disabled
A B C (capital letter)	call enabled in forced mode to numbers A, B, C
b c (small letter)	call enabled but conditioned by the outcome of the calls to numbers A or B

The screen following the previous allows a test call to be made to one of the fax recipients, A, B or C.
Before making such calls, the configuration must be saved so that the parameters displayed coincide with those that are operative.

9.3.3.4 GSM modem configuration

If the modem connected is a GSM cellphone modem, the PIN (Personal Identity Number) can be configured. The PIN is sent to the modem only if the SIM installed requires this, and so, if the PIN is disabled, this parameter may have any value.
If this parameter is set incorrectly, PlantWatch sends the PIN only once and then generates the "PIN Error" alarm event. In the event where PlantWatch is shut-down and re-started, the PIN will be sent again: only 3 attempts are allowed, after which the SIM will need to be removed and, using a cellphone, unlocked using the PUK

9.3.3.5 SMS configuration

GSM modem
To enable the sending of SMS messages using a cellphone modem, the number of the service centre of the mobile network operator supplying the SIM card must be entered. This number must be preceded by the international dialling code (+39 for Italy). If this number is made up of spaces only, it will not be sent to the modem, and the number present in the SIM will be used, if already entered or pre-configured by the network operator.

PSTN modem
To allow the transmission of SMS messages by *PSTN* modem, the number of the service centre of a mobile network operator that supports the UCP/TAP standard must be entered. This number is dialled by the modem to connect to the centre. Also see the paragraph *Send SMS using the telephone line (PSTN) modem.*
The screen *m9* must be accessed to set the parameters Password (***Pass***), *Baud*, *Parity*, *Bits* and protocol (UCP/TAP), as recommended by the service provider. In particular, the values of *Parity, Bits* and *protocol type* must be followed, as if wrong no connection will be possible. The Password is only used by the TAP protocol, it should be entered only if the service centre allows password-protected login, and should normally be left blank.
The sending of the SMS messages can also be enabled or disabled using the corresponding flag on screen *m8*.

9.3.3.6 SMS recipients

Up to 3 numbers can be entered as recipients of the SMS messages; next to each number is a flag to enable or disable the send. As in the FAX screen, these have the values A, B, C for enabling or disabling the call.
The SMS is sent at the same time and in unconditioned mode to all the enabled numbers.
The messages are considered as having been transmitted when the network operator accepts the message; the effective delivery to the recipient's cellphone then depends on the operator.
In addition, there is a screen for sending test messages to the selected recipient; before making such calls, the configuration must be saved so that the parameters displayed coincide with those that are operative.

9.3.4 Parameters > Printer

p1	p2	p3	p4	p5
Printer: Enabled Funct button: Value report Log interval: 10min	Automatic printing Print events: Yes Frq. Val. report 15min	Automatic printing Daily log report Log interval: 10min Print time: 9:08	Automatic printing Grouped daily report Enabled	Automatic printing Weekly log report Day: Tue Print time: 11:00

9.3.4.1 Printer configuration

The initial screen *p1* contains the enabling flag, and the function to attribute to the button on the optional PLWOPPRT00/ PLWOPPRD00 module.
If the enabling flag is deactivated all the print functions will be disabled, and no alarm will be generated relating to the printer or the optional module.
The button on the printer module can have the following functions:

no action (***Disabled***)
immediately print instant value report (***Value report***)
print daily log report (***Daily log report***), in this case the parameter *Log interval* on the screen allows the sampling interval of the report to be set (see paragraph "Automatic printing")
print grouped daily log report (***Grouped daily report***), in this case the parameter *Log interval* has no effect, as the interval is set to 1 hour.
print weekly log report (***Weekly log report***), in this case the parameter *Log interval* has no effect, as the interval is set to 1 hour.

Pressing the button for 4 seconds cancels the print in progress and forces a page feed.

The daily prints generated by pressing the button correspond to the current day, and are thus incomplete concerning the values following the instant the button is pressed.
The weekly prints relate to the week prior to the day of printing, and thus do not include the current day.

9.3.4.2 Automatic printing

The two configuration screens for automatic printing and set time printing allow the following functions to be enabled and configured:
printing of the events in real-time (***Print events***)
enabling and frequency of the value report (***Frq. val. report.***)
enabling of the daily log report (***Daily log report***), print time and setting the sampling interval for the report (see paragraph "Automatic printing")
enabling of the grouped daily log report (***Grouped daily report***). The parameter that establishes the time of the print is the same for the previous print.
enabling of the weekly log report (***Weekly log report***). The parameters associated to this function are the day of the week and the print time.

In cases 2, 3 and 5, disabling is represented by the selection "--------".

9.3.5 Parameters > Alarms/logs

a1	a2	a3	a4	a5
Alarm signals Buzzer: Continuous Enable relay: 5s Prn relay: Disab	Al. relay logic Norm de-energ. Funct. second relay Reset modem	Sampling times Digital time: 30s Analogue HF: 60s Analogue LF: 5m	Variables log Log full alarm signal: Enabled	Variables log reset free space indic. by: Serial download

9.3.5.1 Buzzer activation time or disabling

This parameter allows the operation of the buzzer to be configured. It can be set for activation by time (automatic silencing) or alternatively kept on until the alarm condition no longer exists or the operator intervenes. The times available are: 1, 2, 5, 10, 15 and 20 minutes.

9.3.5.2 Alarm relay activation time

This parameter can be used to modify the type of activation of the local alarm relay. Fixed activation can be set, or alternatively activation by time. The times available are 1, 2, 5, 10, 15 and 20 seconds.

9.3.5.3 Printer board alarm relay activation (Prn relay)

Activating this parameter allows the status of the local relay to be repeated by the relay on the printer board. In this case, the relay can only be set for fixed activation, that is, activated in the presence of an alarm and deactivated when there are no alarms. The logic, that is, de-energised or energised during an alarm depends on setting of the corresponding dip-switch on the board.
With this option enabled, the printer board relay continues to perform the function of watch-dog for the RS485 network, becoming the logical OR for the network alarm condition (WatchDog) and alarms generated by PlantWatch..

9.3.5.4 Alarm relay logic

Allows the setting of two configurations, normally energised or normally de-energised, for the local alarm relay.

9.3.5.5 Function of second relay

The second relay, (**E** in figure **1.3.1**) is normally used for resetting the external modem, and may be configured to signal serious alarms corresponding to the internal operation of *PlantWatch*.

9.3.5.6 High and low frequency analogue sampling period / Digital sampling period

These parameters allow sampling frequency of the variables to be set. For further details see the corresponding chapter.

9.3.5.7 Log full alarm signal

Enabling this parameter allows local and remote signals to be activated for the automatic download of the logs to the service centre and to warn the user of the risk of data loss in the case of failed download via serial line or printer.

9.3.5.8 Reset variable log free space indicator

The generation of the memory full alarms depends on the percentage of the free space available for saving the data. The resetting of this indicator must be selected depending on the mode used to the save the log, that is, printing the report or sending the log to a service centre, so as to ensure that failed connection to the service centre or incomplete printing of a report will activate the alarm.

9.3.6 Language selection

L1

Change language Italian

The language selection allows the language used by PlantWatch to display the user interface and compile the faxes, reports and messages to be changed.

10. QUICK CONFIGURATION

PlantWatch is factory-configured with parameters that can be adapted to a vast number of applications. In this way, a solution can be provided to the user who requires quick installation of the product, and the setting of just a few fundamental parameters.

The following operations must be performed after installing the network of instruments and any peripherals (printer, modem):

Power PlantWatch and the instruments Carel connected to it (Ir32, MPX, pCO,...)
Configure the addresses of the instruments
Power the PlantWatch printer board, printer, external modem, if featured
Access the configuration menu, entering the default password: 3
Select the *Automatic unit configuration* menu, screen *g3,* and start the procedure
When the procedure is complete and the display shows all the peripherals connected, proceed to the following step. If some peripherals are not connected, the configuration can be continued by manually selecting the type and the address of these peripherals
Select the *Unit configuration* menu, screen *g2,* and assign the names of the units in a way that is coherent with the function they perform (the peripheral type field has already been set by the automatic procedure, and should not be changed)
Assign, from screen *g1,* the name and physical address of the installation, making sure not to use names or addresses already attributed to other installations
Configure, if present, the data required to activate the remote signals; FAX, SMS, call to data centre.
Set the logic of the alarm relay as per the connections already made.

11. CONFIGURATION USING "PLANTWATCH MANAGER"

11.1.1 Introduction

PlantWatch is factory-configured with standard values for the parameters and the *templates* of all the major Carel instruments. In most cases, this allows PlantWatch to become operative after a brief configuration procedure using the keypad. Maximum operating flexibility is however achieved by using the ***"PlantWatch manager"*** configuration software.
"PlantWatch manager" is a program that works using the Windows 95, 98, NT operating systems. It allows access to all the configuration parameters, editing of the *templates* that describe the Carel instruments that can be connected to PlantWatch, and editing of the texts displayed and used in reports and faxes. It can be also used via direct serial line or via modem.

11.1.2 Connections and pre-settings required

The set-up operations may be performed "off-line" and saved on file. Before uploading the configuration to PlantWatch, the corresponding connection must be made. This may be a direct RS232 connection, or alternatively via modem.
For a direct serial connection to PlantWatch, the PLW0PPC000 kit must be used. Before starting the read/write operations, the user must check that PlantWatch uses the RS232 port as the default serial port (see the parameter Serial port/Modem configuration). For internal/external modem connections, on the other hand, RS232 mode must be enabled; this can be performed, without modifying the configuration, by pressing the PRG button for 6 seconds. The wait for connection and connection status are displayed by the wait/enabled/connected messages. Standard operation is resumed automatically following 30 seconds of inactivity on the serial connection.

11.1.3 Editing and creating of the "templates" that describe the instruments

The PlantWatch default configuration includes a standard classification for slow delayed, fast delayed and instant alarms, variables to acquire and the corresponding sampling parameters. Custom configurations may be only be created using the optional "PlantWatch manager" program.

11.1.4 Multiple "templates" and self-configuration

If PW features a configuration containing multiple definitions of the same peripheral (for example, more than one IR32C), the PW self-configuration function will no longer be available, that is, the first type found for each model will be used. Up to 32 different configurations can be saved.
The pCO and the pCO² are recognised as two distinct peripherals, however it is not possible to distinguish the applications used; therefore, if PlantWatch contains the "template" of more than one pCO application, only manual configuration will be possible.

12. INSTRUMENT CONFIGURATION

12.1 RS485 RS232 direct mode

The instruments connected to the PlantWatch network can be programmed manually using the relative keypad, or alternatively via serial line using the "MODI" program. In this case, once having entered the addresses of the instruments, the parameters can be programmed automatically by connecting a personal computer to the PlantWatch RS232 serial line. The PLW0PPC000 adapter must be used, as for PlantWatch manager.
To perform the programming, proceed as follows:
Start the Modi program and follow the corresponding instructions
Before starting the transmission of the parameters press the Prg button on PlantWatch for 6 seconds, when the screen "PC setup" appears, press the ⇓ button, to display the following screen:

```
Rs485<->Rs232
 Enable: No
```

then press the ↵ button to activate the 232-485 direct mode. From this moment on PlantWatch will act as an RS232- RS485 converter, and it is thus possible to download the parameters to the selected peripheral.
At the end of the operation, PlantWatch will wait 1 minute and then automatically disable this mode and return to normal operation.

13. TECHNICAL SPECIFICATIONS

13.1 Software characteristics

Software class and structure	A
Maximum number of instruments managed	32
Events/alarms saved	guaranteed 4670 maximum number 9000
Max. variables saved (log)	32 analogue
	64 digital
Recording duration with 32 analogue variables at 10 minutes and 64 digital variables at 20 seconds	13.5 days
SMS protocol via PSTN service centre	TAP/UCP
Line speed to external PSTN modem	115,200 baud
Default PSTN modem	US-Robotics

13.2 Electrical and mechanical specifications

Power supply	
Version PLW00B0000	230Vac ±15% 50/60 Hz PTC internal protection
Version PLW00U0000	115Vac ±15% 50/60 Hz PTC internal protection
Power absorbed	approx. 10VA
Connector	screw terminals for wires with a cross-section of 2.5mm², AWG12
Digital outputs	
Alarm relay	230Vac switching contacts, contacts protected by 250 Vac varistor 2A max resistive/inductive load
Relay for modem reset	230 Vac normally open, contacts protected by 250 Vac varistor 2A max resistive/inductive load
Type of relay action	1C (micro-switching)
Maximum number of switchings	100,000
Insulation between the relays and the very low voltage parts	reinforced
Insulation between the relays and the front panel:	reinforced
Insulation between the two relays	reinforced
Insulation between the terminals of the same relay	functional
Insulation between the very low voltage parts and the front panel	primary
Interfaces	
optically-isolated asynchronous RS485 serial	
Connector	3-way screw terminals for wires with minimum 0.14mm² and maximum 1.5mm² cross-section
Insulation between the parts in very low voltage and the serial output	functional (<50V)
Maximum cable length	1km with AWG20/22 twisted pair and shielded cable, capacitance between the wires <90pF/m
Baudrate	1200÷19200 Baud
RS232 serial	
Connector	8-way telephone connector
Maximum cable length	10m, cable capacitance < 2500pF
Baudrate	1200÷115200 Baud

33.6 PSTN modem (version PLW00M0000 only)	
Connector	standard RJ-11 for direct connection to the telephone line
Approval	The modem is approved according to the CTR21 specifications, and can thus be used in the following countries: Austria, Belgium, Denmark, Finland, France, Greece, Iceland, Ireland, Luxembourg, the Netherlands, Portugal, Sweden, United Kingdom. In Germany an appropriate RJ-11 adapter must be used for all lines that receive the measurement impulses. In other countries an external modem must be used, approved according to local standards.
Various	
Display	alphanumeric 4x20 LCD module, not back-lit
Keypad	silicon, 6 buttons
microprocessor	Hitachi H8-3002 Clock 14.7 MHz
ROM	2 Mbyte flash for code, parameters and log
RAM	256 Kbyte
Real time clock powered by lithium battery	

13.3 General characteristics

Operating conditions	0T40 with 20-80% humidity, non-condensing
Storage conditions	0T70 with 20-80% humidity, not-condensing
Index of protection	IP 65
Period of stress across insulating parts	long
category of resistance to fire and heat	self-extinguishing UL94-V0 category D
immunity against voltage surges	Category II
assembly	wall-mounting
PTI of insulating materials	250 V
Class of protection against electrical shock	Class II

13.4 Dimensions

Width	190
Height	160
Depth	65

Carel reserves the right to modify or change its products without prior notice.

CAREL

Technology & Evolution

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